MUD FLOOD AS A SUITABLE MATERIAL FOR SUBGRADE LAYER OF LOW TRAFFIC VOLUME

NURUL AIN BINTI IBRAHIM

A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Engineering (Geotechnics)

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2016

DEDICATION

For my beloved

Dad: Ibrahim Bin Mamat, Mom: Che Habshah Binti Ismail

Siblings: Muhammad Anis Hafizan, Muhammad Hafis, Muhammad Dudha, Muhammad Shahiran, Nur Fatin Munirah, Muhammad Naqiuddin and Muhammad Alif Daniel

Partners: Azizi Ahmad Fadzil and Nur Zamira Abd Wahab

Thanks for your support, understanding and concern.

I will love you all

Supervisor, Dr Ahmad Safuan Abdul Rashid - thank you for giving me the opportunity to do the research under your supervision and for the priceless knowledge you gave me.

Nur Ain Mustapa, Muhammad Irfan Shahrin, Nur Fatiha Nadia Mansor, Nur ‘Ain Mat Yusof, and Adul Rahman Mohamad Safuan – thank you for helping me to finish this research

Even thousand words could not express my gratitude.

ACKNOWLEDGEMENT

All praises to Allah S.W.T for His blesssing for me in completing this master project which is for almost one year i was doing this final year project. I would like to express my deepest and sincere gratitude to my supervisor, Dr Ahmad Safuan Abdul Rashid for his great supports all the time, help me with brilliant ideas and knowledge, motivation, patience, and guidance in designing the experiments of this research. His big help of giving suggestions and constructive comments throughout the experiment being conducted and thesis works is the big contribution to the success of this research.

Sincere thanks to my labmates, Nur Ain Binti Mustapa and Muhammad Irfan Bin Shahrin who always willing to support and help me in many aspects especially they always accompanied me when I was conducting the experiments in the laboratory and also guide me in writing the thesis. Not forgotten my close friends, Nur Fatiha Nadia Binti Mansor, Nur ‘Ain Binti Mat Yusof, Abdul Rahman Bin Mohammad Safuan and other friends for their moral supports and encouragement in completing this research.

I would also like to express my thanks to all geotechnical laboratory staffs, for their kindness helping me in conducting the laboratory test, teach me on the appropriate method in handling the equipment.

Last but not least, my most special gratitude goes to my beloved parents, Mr. Ibrahim Bin Mamat and Mrs. Che Habshah Binti Ismail and also my siblings for their prayers, endless love, and always supporting me in completing this research.

ABSTRACT

This paper describes a research carried out to identify the basic properties of mud flood soil and the efficiency of SH-85 stabilizer to improve the unconfined compressive strength of the soil. Based on the soil classification test conducted, mud flood soil can be classified as a fine grained soil and grouped as sandy lean clay. Unconfined Compressive Strength (UCS) test were carried out on untreated and treated soils sample with respect to different curing periods of 3 days, and 7 days. Based on the UCS analysis, 10% of SH-85 stabilized with 7days cured sample was the optimum dosage to achieve the minimum required strength of 0.8MPa as a suitable material for subgrade layer of low traffic volume. FESEM and EDAX analysis were carried out on the optimum strength of mud flood sample to investigate the microstructure of the soil. The result indicates that formation of new cementitious products filled the pore space in the soil structure after the sample being treated with 10% of SH-85 stabilizer (optimum dosage). These chemical reaction takes place on the mud flood sample improved the soil strength.

ABSTRAK

Kertas ini menerangkan kajian telah dijalankan untuk mengenal pasti perlakuan asas tanah banjir lumpur dan keberkesanan pemangkin SH-85 dalam meningkatkan kekuatan mampatan tak terkurung ke atas tanah tersebut. Berdasarkan ujian klasifikasi tanah yang dijalankan, tanah banjir lumpur boleh diklasifikasikan sebagai tanah halus secara terperinci dan dikumpulankan sebagai tanah liat yang berpasir. Ujian kekuatan mampatan tak terkurung telah dijalankan ke atas tanah yang dirawat dan tanah yang tidak dirawat, bersamaan dengan masa pengawetan yang berbeza selama 3 hari dan 7 hari. Berdasarkan analisis UCS, 10% daripada SH-85 distabilkan dengan sampel yang telah diawet selama 7 hari adalah dos yang optimum untuk mencapai kekuatan paling minima yang diperlukan iaitu 0.8 Mpa sebagai bahan yang sesuai untuk lapisan subgred daripada jumlah trafik rendah. Analisis FESEM dan EDAX telah dijalankan ke atas sampel tanah yang kekuatannya paling optima untuk menyiasat mengenai struktur mikro tanah tersebut. Keputusannya menunjukkan penghasilan produk bersimen yang baru telah memenuhi ruang liang dalam struktur tanah setelah tanah itu distabilkan kekuatannya dengan 10% daripada SH-85(optima dos). Reaksi kimia yang bertindak ke atas tanah banjir lumpur ini telah meningkatkan kekuatan tanah itu.